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09/416,098	10/12/1999	TERESA H. MENG	ATH-0005	5713

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EXAMINER	
PUENTE, EVA YI ZHENG	

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
04/05/2012	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	09/416,098	MENG ET AL.	
	Examiner	Art Unit	
	EVA PUENTE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 November 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1,4,5,8,9,15,18,19,22,23,29,31,34 and 35* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,4,5,8,9,15,18,19,22,23,29,31,34 and 35* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/21/11*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Request for Continued Examination

1. The request filed on November 21, 2011, for a Request for Continued Examination (RCE) under 37 CFR 1.114 based on parent Application No. 09/416,098 is acceptable and a RCE has been established. An action on the RCE follows.

Response to Arguments

2. Applicant's arguments filed 11/21/2011 have been fully considered but they are not persuasive. Examiner has thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meet the claimed limitation as rejected.

Applicant's argument – Frodigh disclosed measurements have nothing to do with frequency offset, much less an offset between a common frequency reference in each of the remote transceiver units and the common frequency used by the central transceiver unit.

Examiner's response – It appears that the Applicant misunderstood Examiner's reason for rejection. Fouche et al disclose an OFDM receiver system that estimates and corrects carrier frequency offset and sampling frequency offset. Fouche et al did not explicitly disclose an OFDM transceiver system. In other words, Fouche et al did not show a base station communicates with a plurality of mobile station bi-directionally. Frodigh et al, in the same field of endeavor, disclose an OFDM communication system, which comprises a base station (200 in Fig. 2) and mobile stations (202 and 204). While the Applicant may be correct in that Frodigh's C/I measurements are used to reduce co-

channel interference, the focus here is to utilize bi-directional communication between the stations. Frodigh et al provides the teaching of bi-directional communication between the base and mobile stations in OFDM. The rejection is made by the combination of Fouche et al's ability to detect and Frodigh et al's system configuration. Combining the estimation and correction for carrier/sampling frequency offset of Fouche et al in the OFDM transceiver configuration of Frodigh et al would provide detection and correction for carrier frequency offset and sampling frequency offset in each OFDM mobile stations. Therefore, the combination of Fouche and Frodigh meet the claimed limitations.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4, 15, 18, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fouche et al (US 5,313,169) in view of Frodigh et al (US 5,726,978).

a) Regarding claims 1 and 15, Fouche et al disclose a device in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA (OFDM receiver shown in Fig.2), comprising:

means for detecting (FFT 25), responsive to a continuous comparison of received and detected signals (in the receiver) a comparative offset between common

frequency references used locally (Fig. 1, PLL generates reference signal; Col 2, L12-17) by (the receiver) in at least one first signal transmitted, wherein the common frequency reference is a carrier frequency and a sampling frequency (block 213 and 23, Col 10, L30-38);

means for adjusting (FFT 25 and 26) the common frequency reference in accordance with the offsets, so that the effects of the offset will be substantially reduced in preemptive manner.

Fouche et al disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM receiver system, but did not explicitly disclose (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit disposed remotely therefrom using a common frequency; and wherein the common frequency is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit. (2) At least one second signal to be transmitted between the remote and central transceiver units.

However, Frodigh et al disclose a typical OFDM communication system, comprising a base station (200 in Fig.2) and a plurality of mobile stations (202 and 204), which communicate in continuous bi-directional manner for the direct exchange of information with the base station (206, 208, 210, and 212; Col 7, L53-57). Bi-directional communication ability between a base station and mobile stations are well known. Combining the estimation and correction for carrier/sampling frequency offset of Fouche et al in the OFDM transceiver configuration of Frodigh et al would provide detection and

correction for carrier frequency offset and sampling frequency offset in each OFDM mobile stations, thus satisfying the common frequency is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit. Further, the combination of Fouche et al's OFDM receiver with Frodigh et al's mobile station (transceiver) indicating transmission ability with at least one second signal to be transmitted between the remote and central transceiver units. The second signal being in substantial frequency lock with the common frequency since the receiver corrects the carrier and sampling frequency offset. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al's estimating and correcting for carrier frequency offset and sampling frequency offset technique with the mobile stations of Frodigh et al. One of ordinary skill in the art would be motivated to do so to reduce complexity of the clock recovery system at the level of the receiver, thus decreasing its cost.

b) Regarding claims 34 and 35, Fouche et al disclose a device adapted to be used in a communication system, the communication system using one of OFDM, NBFDM, DMT, FDMA and TDMA (OFDM receiver shown in Fig.2), comprising:

means for detecting (FFT 25), responsive to a continuous comparison of received and detected signals (in the receiver) a comparative offset between respective common frequency references used locally (Fig. 1, PLL generates reference signal; Col 2, L12-17) by (the receiver) in at least one first signal transmitted, wherein the common frequency is a carrier frequency and a sampling frequency (block 213 and 23, Col 10, L30-38);

means for adjusting (FFT 25 and 26) the common frequency reference in accordance with the offsets, so that the effects of the offset to be perceived will be substantially reduced in preemptive manner.

Fouche et al disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM receiver system, but did not explicitly disclose (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit disposed remotely therefrom using a common frequency; means for communicating information corresponding to the detected offsets for the central transceiver unit to the first and second remote transceiver units; and wherein the common frequency is a carrier frequency in a first remote transceiver unit and a sampling frequency in a second remote transceiver unit. (2) At least one second signal to be transmitted between the remote and central transceiver units.

However, Frodigh et al disclose a typical OFDM communication system, comprising a base station (200 in Fig.2) and a plurality of mobile stations (202 and 204), which communicate in continuous bi-directional manner for the direct exchange of information with the base station (206, 208, 210, and 212; Col 7, L53-57). Bi-directional communication ability between a base station and mobile stations are well known. The estimation and correction for carrier frequency offset and sampling frequency offset of Fouche et al may implemented in the base station or the mobile stations of Frodigh et al. The mobile stations and the base station are bi-directional, thus communicate information corresponding to the detected offsets. Further, the combination of Fouche

et al's OFDM receiver with Frodigh et al's mobile station (transceiver) indicating transmission ability with at least one second signal to be transmitted between the remote and central transceiver units. The second signal being in substantial frequency lock with the common frequency since the receiver corrects the carrier and sampling frequency offset. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al's estimating and correcting for carrier frequency offset and sampling frequency offset technique with the OFDM communication system of Frodigh et al. One of ordinary skill in the art would be motivated to do so to reduce complexity of the clock recovery system at the level of the receiver, thus decreasing its cost.

c) Regarding claims 4 and 18, Fouche et al disclose wherein the means for detecting in the first remote transceiver unit includes means for performing a correlation on a digital representation of the first signal so as to lock onto the offset in the carrier frequency (220 in Fig. 2).

5. Claims 5, 8, 19, 22, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fouche et al (US 5,313,169) in view of Frodigh et al (US 5,726,978), and further in view of Maneatis (US 5,727,037).

a) Regarding claims 5 and 19, Fouche et al and Frodigh et al in combination disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM communication system, but did not explicitly disclose a means for digitally shifting data in frequency.

However, Maneatis discloses a typical PLL for reducing phase and frequency offset (Fig. 5), comprising a means for digitally shifting data in frequency to be transmitted (502, 504, 506, 510, and 508). PLL is well known in the art for synchronization. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine the estimating and correcting for carrier/sampling frequency offset in an OFDM communication system of Fouche et al and Frodigh et al with the PLL of Maneatis. Thus, data are frequency shifted for synchronization. One of ordinary skill in the art would be motivated to do so to achieve optimum carrier frequency offset compensation in a communication system.

b) Regarding claims 8 and 22, Fouche et al and Frodigh et al in combination disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM communication system, but did not explicitly disclose means for locking onto the offset in the carrier frequency and for producing an output signal corresponding thereto.

However, Maneatis discloses a typical PLL (Fig. 5) for locking onto the offset in the carrier frequency and for producing an output signal corresponding thereto (502, 504, 506, 510, and 508). PLL is well known in the art for synchronization. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine the estimating and correcting for carrier/sampling frequency offset in an OFDM communication system of Fouche et al and Frodigh et al with the PLL of Maneatis. Thus, synchronization is achieved by locking onto the offset in the carrier frequency. One of ordinary skill in the art would be motivated to do so to achieve optimum carrier

frequency offset compensation in a communication system.

c) Regarding claim 29, Fouche et al disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM receiver system, but did not explicitly disclose (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit; and a frequency lock loop in a first remote transceiver unit and a delay lock loop in a second remote transceiver unit. (2) At least one second signal to be transmitted between the remote and central transceiver units.

However, (1) Frodigh et al disclose a typical OFDM communication system, comprising a base station (200 in Fig.2) and a plurality of mobile stations (202 and 204), which communicate in continuous bi-directional manner for the direct exchange of information with the base station (206, 208, 210, and 212; Col 7, L53-57). Bi-directional communication ability between a base station and mobile stations are well known. Combining the estimation and correction for carrier/sampling frequency offset of Fouche et al in the OFDM transceiver configuration of Frodigh et al would provide detection and correction for carrier frequency offset and sampling frequency offset in each OFDM mobile stations. Further, the combination of Fouche et al's OFDM receiver with Frodigh et al's mobile station (transceiver) indicating transmission ability at least one second signal to be transmitted between the remote and central transceiver units. The second signal being in substantial frequency lock with the common frequency since the receiver corrects the carrier and sampling frequency offset. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al's

estimating and correcting for carrier frequency offset and sampling frequency offset technique with the mobile stations of Frodigh et al.

In addition, Fouche et al disclose PLL for carrier and sampling frequency offset correction. On the other hand, (2) Maneatis discloses a frequency lock loop (PLL in Fig. 1) and a delay lock loop (DLL in Fig. 5). The frequency lock loop comprising a frequency shift block (102), while the delay lock loop comprising a timing acquisition unit (502). A PLL uses a VCO to match both frequency and phase. A DLL uses a voltage controlled delay line to match delay (Col 1, L50-57). PLL and DLL are well known and very similar in design and operation. A DLL/PLL can be used for synchronization (720 in Fig. 7; Col 15, L13-19). Thus, replacing PLL of Fouche et al with DLL of Maneatis would provide sampling frequency offset estimation and correction. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al's estimating and correcting for carrier and sampling frequency offset with the mobile stations of Frodigh et al, and with the PLL/DLL teaching of Maneatis. The combination indicates an OFDM communication system comprising a base station in a bi-directional communication with a plurality of mobile stations. A first mobile station comprises a frequency lock loop and a second mobile station comprises a delay lock loop, the frequency and delay lock loops being adapted to detect comparative carrier and sampling frequency offsets in the respective first signals and to produce offset information corresponding thereto indicative of offsets between respective common frequency references locally used at the remote and central transceiver units; and a frequency shift block in said first remote transceiver units and a timing acquisition unit in

of said second remote transceiver units respectively coupled to receive the offset information and digital data to be transmitted by said first and second remote transceiver units in at least one second signal to be received by the central transceiver unit disposed remotely therefrom, the frequency shift block and timing acquisition unit being respectively adapted to digitally shift and sample the digital data in frequency in accordance with the common frequencies and frequency offsets corresponding thereto to correct for errors in the common frequency references used locally at the central transceiver unit, so that the effects of the carrier and sampling frequency offsets to be perceived by the central transceiver unit will be substantially reduced in preemptive manner. One of ordinary skill in the art would be motivated to do so to reduce complexity of the clock recovery system at the level of the receiver, thus decreasing its cost.

6. Claims 9, 23, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fouche et al (US 5,313,169) in view of Frodigh et al (US 5,726,978), further in view of Maneatis (US 5,727,037), and in further view of Cook (US 5,818,889).

a) Regarding claims 9 and 23, Fouche et al, Frodigh et al, and Maneatis in combination disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM bi-directional communication system, but did not explicitly disclose means for variably adjusting a reference frequency output by a crystal oscillator in accordance with the output signal generated by the locking means.

However, Cook discloses a variable crystal oscillator (VXO) is typically used as a part of PLL to track variations in received phase with low jitter (Col 2, L6-8). Applying a VXO in the PLL of Maneatis provides desirable reference frequency for carrier frequency offset compensation. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al, Frodigh et al, and Maneatis' teaching of estimating and correcting for carrier/sampling frequency offset in an OFDM bi-directional communication system with the VXO of Cook. One of ordinary skill in the art would be motivated to do so to facilitate varies PLL tracking in received phase with low jitter in an OFDM communication system.

c) Regarding claim 31, Fouche et al disclose estimating and correcting for carrier frequency offset and sampling frequency offset in an OFDM receiver system, but did not explicitly disclose (1) a plurality of remote transceiver units operable to communicate in continuous bi-directional manner for the direct exchange of information with a central transceiver unit; a frequency lock loop in a first remote transceiver unit and a delay lock loop in a second remote transceiver unit; a crystal oscillator; and variable adjustable devices. (2) At least one second signal to be transmitted between the remote and central transceiver units.

However, (1) Frodigh et al disclose a typical OFDM communication system, comprising a base station (200 in Fig.2) and a plurality of mobile stations (202 and 204), which communicate in continuous bi-directional manner for the direct exchange of information with the base station (206, 208, 210, and 212; Col 7, L53-57). Bi-directional communication ability between a base station and mobile stations are well known.

Combining the estimation and correction for carrier/sampling frequency offset of Fouche et al in the OFDM transceiver configuration of Frodigh et al would provide detection and correction for carrier frequency offset and sampling frequency offset in each OFDM mobile stations. Further, the combination of Fouche et al's OFDM receiver with Frodigh et al's mobile station (transceiver) indicating transmission ability with at least one second signal to be transmitted between the remote and central transceiver units. The second signal being in substantial frequency lock with the common frequency since the receiver corrects the carrier and sampling frequency offset. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al's estimating and correcting for carrier frequency offset and sampling frequency offset technique with the mobile stations of Frodigh et al.

In addition, Fouche et al disclose PLL for carrier and sampling frequency offset correction. On the other hand, (2) Maneatis discloses a frequency lock loop (PLL in Fig. 1) and a delay lock loop (DLL in Fig. 5). The frequency lock loop comprising a frequency shift block (102), while the delay lock loop comprising a timing acquisition unit (502). A PLL uses a VCO to match both frequency and phase. A DLL uses a voltage controlled delay line to match delay (Col 1, L50-57). PLL and DLL are well known and very similar in design and operation. A DLL/PLL can be used for synchronization (720 in Fig. 7; Col 15, L13-19). Thus, replacing PLL of Fouche et al with DLL of Maneatis would provide sampling frequency offset estimation and correction. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al's estimating and correcting for carrier and sampling frequency offset with

the mobile stations of Frodigh et al, and with the PLL/DLL teaching of Maneatis. The combination indicates an OFDM communication system comprising a base station in a bi-directional communication with a plurality of mobile stations. A first mobile station comprises a frequency lock loop and a second mobile station comprises a delay lock loop. One of ordinary skill in the art would be motivated to do so to reduce complexity of the clock recovery system at the level of the receiver, thus decreasing its cost.

Moreover, (3) Cook discloses a variable crystal oscillator (VXO) is typically used as a part of PLL to track variations in received phase with low jitter (Col 2, L6-8). Applying a VXO in the PLL (frequency synthesizer) of Maneatis provides desirable reference frequency for carrier frequency offset compensation. Therefore, it is obvious to one of ordinary skill in the art at the time of invention was made to combine Fouche et al, Frodigh et al, and Maneatis' teaching of estimating and correcting for carrier/sampling frequency offset in an OFDM bi-directional communication system with the VXO of Cook. One of ordinary skill in the art would be motivated to do so to facilitate varies PLL tracking in received phase with low jitter in an OFDM communication system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eva Y Puente whose telephone number is 571-272-3049. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

March 26, 2012

/EVA Y PUENTE/
Primary Examiner, Art Unit 2611